

ONLINE STUDENTS' APPOINTMENT SYSTEM FOR UNIVERSITY ADMINISTRATION

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Abstract: *Current practice in Universiti Teknologi MARA (UiTM) Cawangan Melaka Kampus Jasin is student will go to the administrative unit and set an appointment manually if they want to deal with the administrative personnel. However, there were few issues discovered from a comprehensive online survey that have been conducted among students and administrative staff. 96.49% students who responded, stated that they had an issue that it takes a long time to acquire confirmation of the appointment date. On the other hand, from the perspective of the 4 administrative respondents, they faced the challenge to manually arrange student appointments. Hence, the main aim of this study is to improve the scheduling appointment process from manual practice to online system. The Waterfall Model is applied for in this study, and it is divided into three phases which are requirement analysis, system design, and implementation. An interview session with administrative staffs was conducted to gather information and analyze the requirement needed. The feedback from stakeholders concluded that this online web-based system considers received 'above average' level of usability acceptance since the overall mean score of SUS is 68.9. Thus, this study accomplished its aim, and the proposed system can assist administrative staff and students in having a proper and organized appointment process. However, to use this system, it needs further improvements and modifications.*

Keywords: *online students' appointment, scheduling system, system usability, university administration*

Introduction

Appointments or arranging to meet someone at a particular time and place to receive service is a support by the supplier to the customer that helps the customer to have an easy and enjoyable experience with the service providers. Alternatively, customers without appointments or “walk-ins”, on the other hand, are frequently welcomed and accepted. Providing service to walk-ins benefits a company in a variety of ways, including increased sales, a larger client pool, and the development of a positive business image. However, there are challenges to walk-in appointments compared to the regular appointment (Wang et al., 2019).

Kampus Jasin which is in Melaka, Malaysia, is one of the campuses in UiTM Melaka that consist of thirteen departments. According to the online questionnaire using google form that has been distributed to the students and administrative staffs, 44% of students make appointments for academic matters, 49% are for approval of events or any signatory for verification of documents and the remaining are for financial and medical matters. The departments mostly involved are Academic Affairs Departments (HEA) and Students Affairs Division (HEP) under Faculty of Computer and Mathematical Sciences (FSKM) at UiTM Kampus Jasin. Therefore, the project only focussed on the two main departments, HEA and HEP of FSKM. Administration Unit and College Management Unit (UPK), which are the sub-unit under the of HEP have been included as it deals with the accommodations and well-being of the students on campus.

The interview session was conducted with stakeholders to receive and gain more information and strong evidence regarding the current process. Fig. 1 shows the business flow of the current process of students to make an appointment. Currently, all the business process with the student who requesting for an appointment is being done manually. It also being stated that they need a comprehensive method to monitor students who want to meet with the person in charge. Most students would come straight to the office without contact them first to seek out if the person in charge is available to be able to meet at the office. Student who usually come straight to the office is because of emergency matters. Administrative staff who could handle to help the student with the emergency matters can directly manage it. However, for some cases, if they cannot manage it even though it is a critical issue, the staff have to request the students to come to the office in the next day perhaps that the person in charge will be available that time or help to arrange the appointment for them. Hence, for some non-critical matters, only few of them would contact the office first through phone call or emailed before they come to the office. Because of that, the administrative staff find it difficult to monitor, arrange and manage the student's issue which needed a proper scheduling technique.

In short, three problems that have been identified through an online questionnaire and interview session were the method of manually arrange an appointment is disorganized and tedious, no proper scheduling technique in handling the priority concern and no reminder to notify students a day before the date of the appointment.

As a solution, the aim of the study is to develop a web-based system, which is Online Appointment System for Administration in UiTM Kampus Jasin, Melaka that to help the administrative staff manage the student's appointment request as well as with email notification of the scheduled appointment for the student. The objectives of this study are to gather and analyze the requirements needed, to design a web-based system based on all the requirements that has been analyzed and lastly to develop the proposed system. As mentioned by (Bello et al., 2016), innovative platforms like this will allow students to book anywhere and anytime, via

smartphone, computer, or any type of gadgets, through several ways, significantly increase the booking capacity. Furthermore, a web-based system to facilitate the appointment process is needed can eradicate these human mistakes due to the manual scheduling procedure. Fixed scheduling is most popular and commonly used technique (Nathan & Marilyn, 2020). In their research, they found that patients usually will set the timetable within their business hours only. Based on (Razak et al., 2017), e-mail is the most common technique of communicating with the computer, which is more dependable and very convenient in businesses.

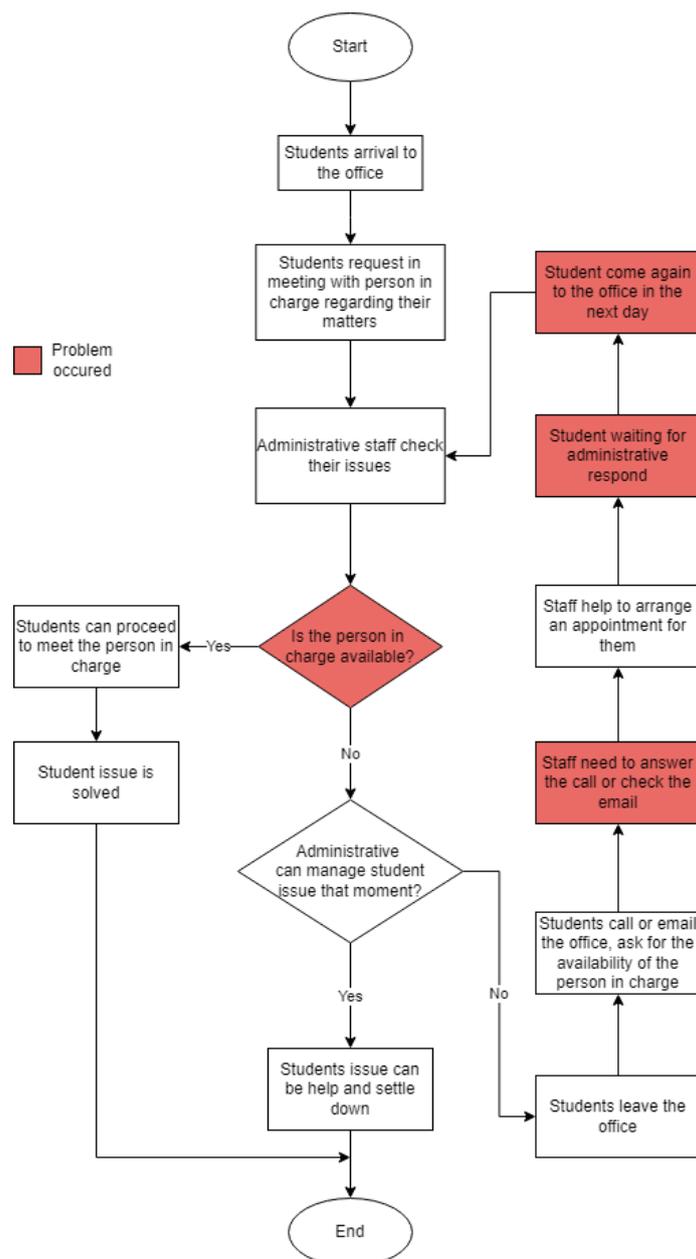


Figure 1: Business flow of current students' appointment process in administration UiTM Kampus Jasin, Melaka

Related Works

In this section, environment domains related to the proposed system are reviewed. The related works contents were divided into two subsections: online appointment scheduling system and comparison of existing system.

Online Appointment Scheduling System

The world is growing fast with the use of the Internet, people around the world will basically enjoy the quickly access data and book through online. In this field of information technology this booking system has been commonly used. An online appointment system is a software system which enables potential users to book any appointment or reservation of date by themselves, while providing the best tools for operational management and scale, all in one location (Odgers et al., 2017). According to (Chinratan et al., 2016) the online booking and reservation system generates a larger opportunity to improve the conditions of people's lifestyles in general. This method simplifies people's lives and thus contributes to new ideas for best services for companies and businesses. The online system is also expected in the coming years to be a huge wave on the internet of things (IoT).

Many online appointment scheduling systems was created and deployed in a way that was somewhat user friendly and safe. Online appointment scheduling systems were created in reaction to the shortcomings of traditional ones. Currently, organization face a high patient no-show rate and extended wait times due to the lack of an online appointment scheduling system (Habibi et al., 2019).

Comparison of Existing System

Several website programs have been created by various organizations and companies to provide a positive experience and increase their customer satisfaction. Table I shows the comparison between the three existing systems that have been reviewed in relation to this study, namely Schedule Once, Janji Temu Online KWSP and Temu Janji Online Jabatan Imigresen Malaysia. From this Table I, it is clear from the existing system the features that can be used at present in developing the project. Several website programs have been created by various organizations and company to give positive experience and increase the satisfaction of their clients. In addition, it is clearly indicating from the existing system which features may be used nowadays in develop the project.

Methodology

Web application is platform by far the most appropriate application for the users. It is more suited for administrative staff to use since it is a web-based application that meets the need of the user and is built on a standard client-server architecture. Moreover, according to (Kambala, 2016), web-based applications are a category of software that enables users to communicate with a central server using a web browser interface.

In the software development approach, the Waterfall Model is applied. It was divided into three phases which are requirement analysis, system design, and implementation. It implements iteration between phases, with the limitation of supplying iteration only between consecutive phases where necessary, to reduce the cost of revision that is happen by iteration over several phases (Sethi et al., 2016). It is critical to evaluate any restrictions and constraints that may impact the development process (Zulqadar, 2019). In the research of (Zulqadar, 2019), the system design is created, which describes hardware and system needs such as data layers, programming, internet infrastructure, user interface, and many more. However, the Waterfall Model is a serial model that follows a strict sequence that when a problem is occurred at any point of software development, there is no way to return to an earlier stage to fix the problem (Halani & Jhaharia, 2021).

All activities in the first phase will be documented in the Software Requirement Specification (SRS). Meanwhile, all the design in the second phase will be documented in Software Design

Document (SDD). For the third phase, the fixed scheduling technique and merge sort technique are being implemented as well as the email notification in the system. The following three subsections describe the implementing proposed idea; system use case diagram, activity diagram and evaluation and acceptance

Table 1: Comparison Between Each Existing System

Features	Schedule Once	Janji Temu Online KWSP	Temu Janji Online Jabatan Imigresen Malaysia
Application Programming Interface (API)	No	Yes	No
Access Control Permission	Yes	No	No
Calendar Management	Yes	Yes	Yes
Booking Management	Yes	Yes	Yes
Email Management	Yes	Yes	Yes
SMS Messaging	Yes	Yes	No
Notification or Alerts	Yes	Yes	Yes
Chat or Messaging	No	Yes	No
Survey and Feedbacks	No	Yes	No

System Use Case Diagram

Figure 2 shows the system use case diagram for this study. The use case for this project was developed based on the analysis through the requirement gathered from the interview of stakeholders. This system has three users which are administrative staff, students, and admin. There are six use cases for administrative staff, six use cases for students, and six use cases for admin. Hence, the total of this use case consists of fifteen use case. However, the main use case for this project is manage appointment for the staff to manage the student's appointment.

Activity Diagram

The business activity diagram is based on the use case description, and it visually represents in the flow of the process. Fig. 3 shows the activity diagram of manage appointment use case. This diagram illustrates the flow of the manage appointment function that is handling by the administrative staff in the system.

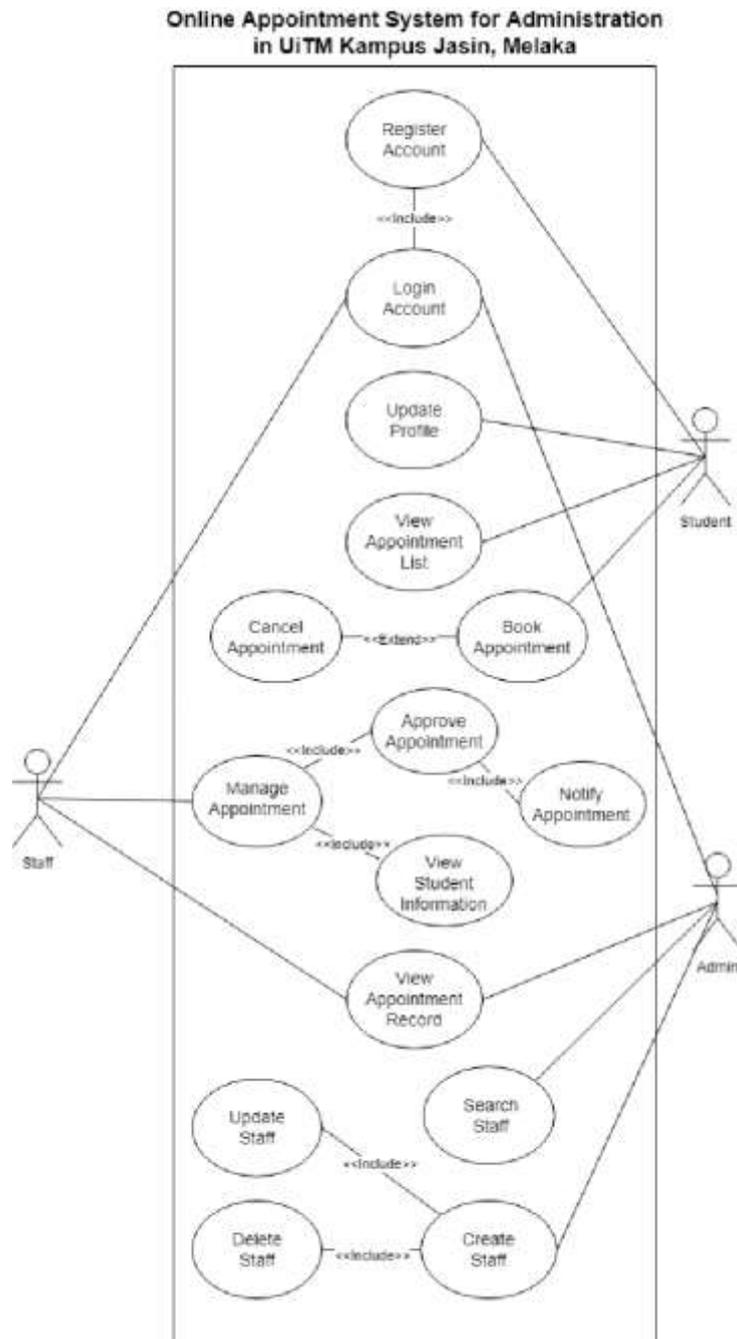


Figure 2: Use case of Online Appointment System for Administration in UiTM Kampus Jasin, Melaka

Evaluation and Acceptance

This study used the most popular standardized usability questionnaire; the System Usability Scale (SUS) to measure users' perceived usability of the system (Brooke et al., 1996). It is a 10 items questionnaire designed as shown in Fig. 4. The participant's scores for each question will be converted to a new number, added together and then multiplied by 2.5 to convert the original scores of 0-40 to 0-100.

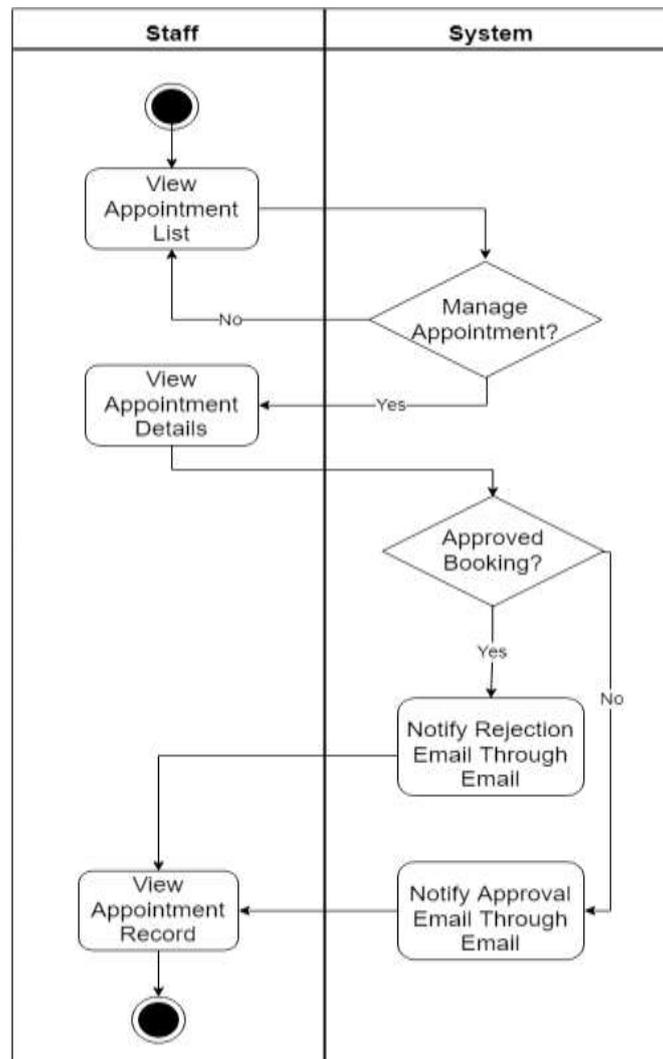


Figure 3: Activity diagram of manage appointment use case

The System Usability Scale Standard Version		Strongly disagree					Strongly agree				
		1	2	3	4	5	1	2	3	4	5
1	I think that I would like to use this system.		<input type="radio"/>								
2	I found the system unnecessarily complex.		<input type="radio"/>								
3	I thought the system was easy to use.		<input type="radio"/>								
4	I think that I would need the support of a technical person to be able to use this system.		<input type="radio"/>								
5	I found the various functions in the system were well integrated.		<input type="radio"/>								
6	I thought there was too much inconsistency in this system.		<input type="radio"/>								
7	I would imagine that most people would learn to use this system very quickly.		<input type="radio"/>								
8	I found the system very cumbersome to use.		<input type="radio"/>								
9	I felt very confident using the system.		<input type="radio"/>								
10	I needed to learn a lot of things before I could get going with this system.		<input type="radio"/>								

Figure 4: The System Usability Scale Standard Version

Results and Discussion

This section discusses the results and findings gained from the study.

Requirement Analysis (Phase 1)

In this first phase of the Waterfall Model, the activity is to gather and analyze the information and system requirement from the stakeholder. Distributing a questionnaire through online using google form and conducting an interview through phone call as well as WhatsApp application are two activities that is used to obtain information from stakeholders to develop the system. This phase is to achieve the first objective of this study, which is to gather and analyze requirements. There are 9 questions in total but as illustrated in Table II, only a few survey questions and supportive answers in obtaining the background of the study, project aim and problem statements for system development are shown.

Table 2: Survey Questions and Answers

No	Question	Answer	Findings
Questions for Student			
1.	What is the type of business of your appointment?	49.1% Signature of document approval 43.9% Academic	Background of Study
2.	How long will it take to get a confirmation of the appointment date?	47.4% 3-4 days 38.6% 1-2 days 10.5% Almost a week	Problem Statement
3.	What medium that you refer to set up the appointment with any department in UiTM Cawangan Melaka Kampus Jasin?	73.7% WhatsApp 56.1% Phone Call 45.6% Telegram 31.6% Email	Problem Statement
Questions for Administrative Staff			
4.	What is the common type of business for the appointment?	75% Signature of any document approval 25% Student registration and examination record	Problem Statement
5.	What is the preferable medium used to arrange the appointment?	75% Email 50% Phone Call 50% WhatApps	Problem Statement
6.	If a Booking Appointment System is developed, what capabilities would you like the system to have to assist the booking process?	1. Facilities remote students to interact and obtain information. 2. Display slots schedule that is available for book.	Project Aim

From the interview by phone call and WhatsApp that had done with officers representing from HEP and HEA, they said that administrative staffs faced the challenge of manually arranging student appointments, which takes a long time to give confirmation of appointment date and overscheduling, which causes many students to come at the office at the same time. Moreover, sometimes, they felt distract when students frequently call to ask about the person in charge availability at the office.

System Design (Phase 2)

This phase is to achieve the second objective. The user interface design which designing it on storyboard is created as part of the system's pre-production phase. Fig. 5 shows the administrative staff side of the storyboard, which represents the system flow for managing student appointments in the system. If the staff chooses to handle the pending appointment, it will be redirected to the next appointment interface. The staff then can decide whether to approve or reject the student appointment.



Figure 5: Storyboard for Online Appointment System for Administration in UiTM Kampus Jasin, Melaka

Implementation (Phase 3)

System implementation is the final step of the Waterfall Model to construct the system based on the findings and information gathered (objective 3). This phase is completed by completing the processes of developing the system, implementing the database, implementing the scheduling technique, and finally implementing the email notification.

1. Scheduling Technique

A student must schedule an appointment two working days before the desired date. Fig. 6 shows the student's option to pick the appointment's start and end times. The student is only allowed to choose a time within a two-hour range. Students are not permitted to schedule appointments for more than two hours. The student can then fill in the remaining details in the form and click the submit button to submit the appointment details.

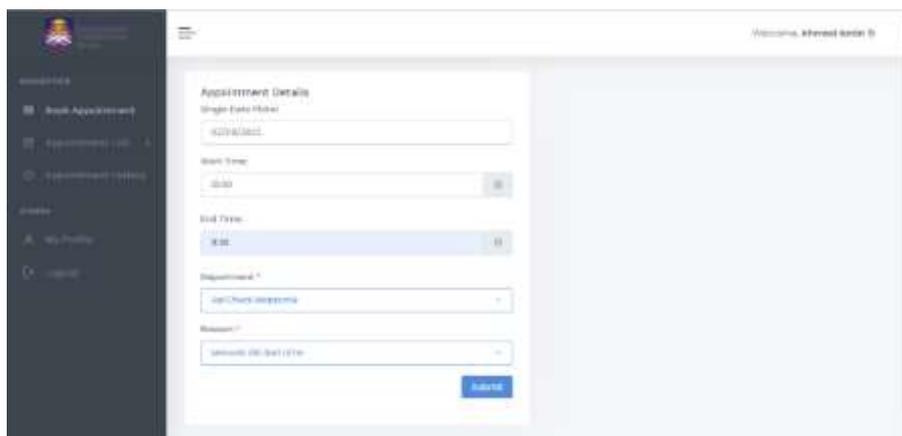


Figure 6: User Interface in Booking Appointment

2. Sorting Technique

The sorting technique is implemented in this project. The technique that has been chosen is the merge technique, which is basically much more efficient and stable as well as easier to code and apply in the system. The process of the merge sort technique divides the data into half iteratively until it reaches the base case of an array with one element (Bron, 1972), (Sahil & Prerna, 2019). The merge function then selects the sorted sub-arrays and combines them to progressively sort the full array. The algorithm is not complicated as well, which makes it suitable to be implemented in sorting the appointment list section with the status pending only based on their own priority. Each of the appointment reasons holds its own priority from lowest to highest concern. The top appointment reason listed is on the highest priority, which the administrative staff need to prioritize and manage their appointment first. Fig. 7 shows the user interface of the pending appointment list that is already being sorted based on the priority.

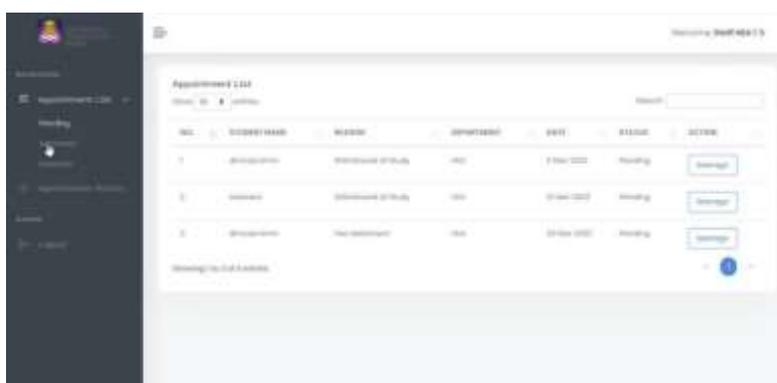


Figure 7: User Interface in Appointment List (Pending)

3. Email Notification

In the research of (Pagliaro, 2020), electronic email or E-mail, is information stored on a device that is shared in between two users through telecommunications. One of the distinguishing characteristics of e-mail service is e-mail is a communication technology that integrates flexibility and near-instantaneous information sharing through a wireless network of computers (servers) that is now essentially global. Meanwhile, according to (Lincoln, 2019), push notifications do not necessarily require the user to open a new application if they want to view a post. Alternatively, the message will be sent directly to the user's personal device such as their computer, tablets, or mobile device and can immediately be seen by them. Meanwhile, reminders are an important part of the appointment booking system because they can avoid the

need for rescheduling of appointments, missed deadline appointments issue and other matters. Reminder can be delivered, for example, through e-mail (McLean et al., 2016).

When developing the system, email notification was implemented just so the student would receive an email after the administrative staff approved or rejected their appointment, and another reminder of the appointment date would be sent a day before to remind the student. This method will make it easier for the student to receive emails from the Gmail account, UiTM account or any email platform that student has been registered in the system. Furthermore, by including this email into the system, the receiver will be more likely to open the email received because it was an appropriate way to know the status of the appointment. The sample of email receive from HEP department is as in Fig. 8.

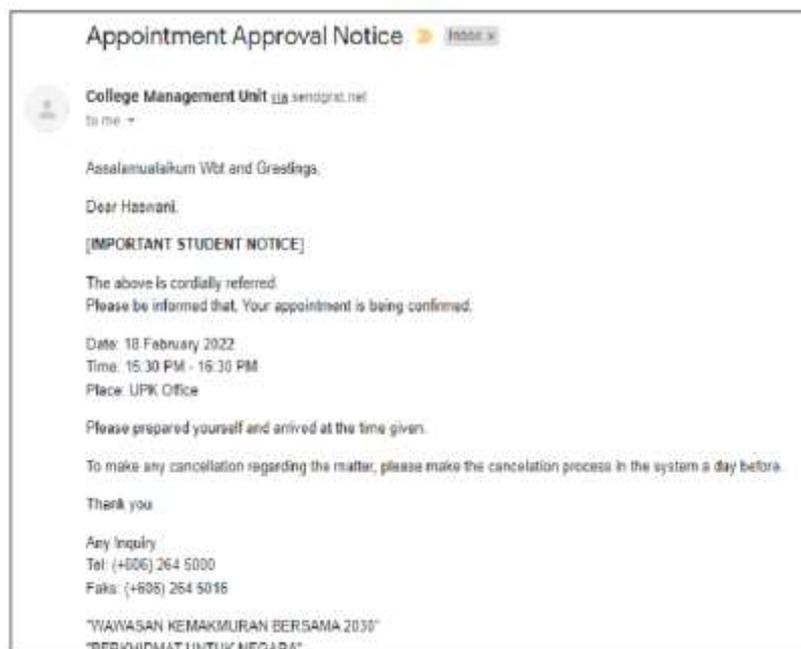


Figure 8: Confirmation email

Usability Testing

We evaluate the feedback on systems developed through SUS surveys distributed to stakeholders and summarize the SUS results. To interpret SUS score, percentiles approach was used. The average SUS score at the 50th percentile is 68. A SUS score that above 68 would be considered above average and anything below 68 would be considered below average. In summary, the overall mean SUS score for the Online Students' Appointment System for Administration University is 68.9 as shown in Table III, conclude that the system considers received 'above average' level of usability acceptance.

Table 3: Sus Score Calculation

Stake-holder	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	SUS Score
s1	5	4	5	2	5	2	4	3	4	5	67.5
s2	4	4	4	4	4	3	4	3	5	3	60.0
s3	4	2	4	3	3	2	4	3	4	3	65.0
s4	5	3	3	2	3	3	5	3	5	1	72.5
s5	4	3	4	2	4	3	4	3	4	2	67.5

s6	5	2	5	1	4	2	5	2	5	1	90.0
s7	5	3	5	3	5	2	4	2	5	3	77.5
s8	5	3	4	4	4	4	4	3	4	4	57.5
s9	5	5	5	4	4	2	5	1	4	4	67.5
s10	4	4	5	3	4	3	5	4	5	4	62.5
s11	3	5	5	1	4	3	5	3	4	1	70.0
Average SUS Score											68.9

Conclusion

This study accomplished its aim by completing the three objectives mentioned based on the activities completed in the first three phase of the Waterfall Model applied as well as successfully implemented the fixed scheduling technique and merge sort technique. The usability test using a 10-item questionnaire in SUS showed good results with a mean score of positive evaluation value indicating that the stakeholder score exceeded the average perceived usability using the proposed system. However, several recommendations may be made to improve system functionality, and new system features may be added in the future. By improving this area, the process of solving student issues will be significantly faster, saving both the student's and administrative staff's time in scheduling and managing the appointments.

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References

- A. Zulqadar, SDLC Waterfall Model: The 6 phases you need to know about," Retrieved from: <https://rezaid.co.uk/sdlc-waterfall-model/>. 2019.
- C. Bron, Merge sort algorithm [M1]," Communication of the ACM, vol. 15(5), pp. 357-358, 1972.
- C. Kambala, The Benefits of Web-Based Computer Science and Control System, vol. 9(2), pp. 15-18, 2016. Systems for Business — Aezion", Retrieved from: <https://www.aezion.com/2018/10/13/web-based-systems-benefits/>.
- G. A. Sethi Asst College, A Comparison of Waterfall, Spiral, Agile Models," Int. J. Eng. Res. Comput. Sci. Eng., vol. 3, no. 8, 2016.
- J. Brooke, SUS: 'Usability Evaluation in Industry'. CRC Press, London, 1996.
- J. E. Lincoln, EMAIL VS. PUSH NOTIFICATIONS PRO'S CON'S AND WHEN TO SEND WHICH.pdf," Retrived from: <https://ignitevisibility.com/email-vs-push-notifications/>. 2019.
- K. R. Halani and K. Jhajharia, A Quantitative Study of Waterfall and Agile Methodologies With the Perspective of Project Management," 2021. doi: 10.4018/978-1-7998-7872-8.ch007
- K. Sahil, and S. Prerna, Sorting Using a Combination of Bubble Sort, Selection Sort & Counting Sort," International Journal of Mathematical Sciences and Computing, vol. 5(2), pp. 30–43, 2019. <https://doi.org/10.5815/ijmsc.2019.02.03>
- M. Chinratan. How Online Booking and Reservation System is Changing Our Life for the Better. Retrieved from: <https://www.digitaldoughnut.com/articles/2016/september/how-online-booking-and-reservation-system-is-chang>. 2016.
- M. Pagliaro, Enhancing the use of e-mail in scientific research and in the academy," Heliyon, vol. 6, 2020.
- M. R. M. Habibi, F. Mohammadabadi, H. Tabesh, H. Vakili-Arki, A. Abu-Hanna, and S. Eslami, Effect of an Online Appointment Scheduling System on Evaluation Metrics of

- Outpatient Scheduling System: a before-after Multicenter Study," *J. Med. Syst.*, vol. 43, no. 8, Aug. 2019, doi: 10.1007/s10916-019-1383-5.
- N. F. A. Razak, N. H. Mustaffa, N. H. M. Radzi, R. Sallehuddin and E. N. Bazin, "Web based online bakery system with short messaging service and email notification," 2017 6th ICT International Student Project Conference (ICT-ISPC), 2017, pp. 1-4, doi: 10.1109/ICT-ISPC.2017.8075355.
- Nathan, Marilyn, "Managing appointments," in *A Handbook for Headteachers*, 2020. doi: 10.4324/9780203062425-10.
- R. O. Bello, M. Olugbebi, A. O. Babatunde, B. O. Bello and S. I. Bello, "Student-Teacher Online Booking Appointment System in Academic Institutions," *Journal of Computer Science and Control System*, vol. 9(2), pp. 15-18, 2016.
- S. M. McLean, A. Booth, M. Gee, S. Salway, M. Cobb, S. Bhanbhro and S. A. Nancarrow, "Appointment reminder systems are effective but not optimal: results of a systematic review and evidence synthesis employing realist principles," *Patient Preference Adherence*, vol. 10, pp. 479-499, April 2016.
- S. Wang, N. Liu and G. Wan, "Managing Appointment-Based Services in the Presence of Walk-in Customers," *Customer Management Science*, vol. 66(2), pp. 667-686, 2019.
- T. Odgers. "What Exactly is an Online Booking System?." Retrieved from: <https://www.checkfront.com/what-is-an-online-booking-system>. 2017.